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ABSTRACT

Dial access information retrieval systems enable learners at remote locations to dial and receive instantaneous access to a wide range of selected audio and video materials. If such systems are to succeed and proliferate, a concerted attempt must be made to produce software based on student and curricular needs; a program must be constructed which stresses a positive, content oriented approach to teacher training; and flexible, economic, durable, and reliable hardware must be designed and produced. (SP)

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AT WILL AND AT ONCE

THE AUDIO-VIDEO DIAL ACCESS INFORMATION RETRIEVAL SYSTEM

by Ira J. Singer *

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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The Purposes of Dial Access

The need to retrieve information "at will and at once" grows more pressing with each passing day. Although computers have been effective in solving vexing storage problems, relatively little companion technology has been developed for high-speed selection and retrieval of information in familiar audio and video modes. Students learning job skills at school, expectant mothers in the ghetto administering self-care during prenatal periods of pregnancy, teachers observing student (and teacher) behavior in a variety of teaching-learning situations, citizens requiring transportation directions to a nearby hospital --all are seekers of selected information at specific times for specific purposes. Relatively few packages of such information exist to satisfy these needs, but even where they do, they are not readily available to potential users on a demand basis. The major purpose of a dial access information retrieval system, then, is to enable learners at remote locations to dial and receive instantaneous access to a wide range of selected audio and video materials.

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By the twirl of a mounted dial, the school-based student sitting in the privacy of a dial access carrel (or booth), can signal into action audio tapes containing poetry and dramatic readings, instrumental and vocal music, foreign language and art lectures, and countless other instructional programs. A change in the dial code can bring any film, video tape, slide or other visual material into view on the user's personal television screen. For example, the student studying urban development might dial a filmed interview of Robert Moses on urban planning, an audio tape by Louis Mumford on the impact of the automobile upon urban life, video taped interviews of families awaiting eviction or relocation as a result of a redevelopment project, a chamber of commerce sould-slide program extolling the virtues of the project and a video tape of other local areas slated for future redevelopment.

In other carrels, or in classrooms where dial access programs may be viewed by groups of students on larger viewing screens, students pursuing an in-depth study of air and water pollution might dial a preselected segment of the film, "Poisons, Pests, and People," a video taped interview of Rachel Carson, recorded readings from "Silent Spring," a series of slides depicting lung and other respiratory ailments related to polluted air, a video tape of local sources of polluted water and smoke poisoned air, audio interviews of local businessmen justifying their

dumping of wastes into inland waterways, and a video taped discussion of political leaders recommending corrective legislation and other possible remedies.

In addition to such special purpose materials, learners could dial video tapes containing instructional procedures basic to the school curriculum. For example, a student might obtain skill instruction in painting and sculpture techniques, the typing keyboard, wiring of circuit boards, repairing small appliances or fingering stringed or brass instruments via a dial access system. Originating in regional information centers, selected messages may be transmitted in audio and video modes via coaxial cable to individuals or groups dialing from a far-ranging cross-section of strategically placed remote locations.

The system can be useful for a variety of individuals dialing in from non-school locations. Medical, legal, and instructional tapes could be dialed by ghetto tenants from store fronts, laundromats, bus terminals, tenement lobbies and, eventually, living rooms. Users might include an unemployed family head requiring guidance for receipt of welfare benefits, a police suspect seeking legal aid, a high school youth needing information concerning the availability of after-school employment. Information basic to life itself but generally unavailable in convenient form to the ghetto resident can be made available on demand.

The Operation of Dial Access

The school based dial access system serves independent learners and groups of students. The major components of a dial access system are: a) a program origination center housing such equipment as video tape recorders, switching gear, audio tape decks, intercom console, and instructional software; b) coaxial cable required to carry programs from the originating center to the remote receiving points; c) the receiving locations (carrels and classrooms) containing the remote switching and demodulation equipment, television monitors, audio headsets.

The student using an independent study carrel would first obtain the title and description of any desired information through the school library file or special catalogue containing program descriptions. The desire to dial an audio or video tape may originate with the student doing an in-depth study of a specific topic or with his teacher assigning the program as part of a class project. Upon entering the carrel (a three-sided, acoustically treated booth approximately 48" high, 42" wide, 36" deep with a 24" by 42" writing surface), the student is confronted by a 9" transistorized television receiver, double earphones with an attached microphone, and a telephone-type dial plate[1]. The dial control plate has a conventional telephone dial, an on-off

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[1] See Appendix for photographs

power switch, audio volume control knob, two headphone jacks, a three position intercom microphone switch, and an intercom signal lamp. The student may then dial a number as listed on his library or catalogue card and receive the picture or sound he requires. He may, if he wishes, call the origination center by intercom and ask for special programs. Another alternative open to the user is to dial a reference number and receive a TV scanning of all programming available at that particular time. The variety of programming that can be transmitted simultaneously is determined by the availability of pertinent software, the number of different pieces of originating equipment on hand (video tape recorders, audio tape decks, film chains), and the number of channels available via a single video cable.

The act of dialing the correct program number of a specific video tape in a remote carrel activates a video tape recorder in the origination center. The video signal is transmitted from the origination center via coaxial cable to the receiving location where it is converted to the images and sounds seen and heard by the learner.

A classroom is equipped with a 25" video monitor, a high fidelity sound column and a dial plate. The dial

control plates in the classroom and carrels have the same telephone type dial, intercom facilities, and audio volume control.

One major difference between the carrel and classroom dial panels is the addition of audio and video input jacks. On each classroom panel, provisions have been made to connect a camera and microphone. This allows the system to make video and audio tapes by taking only a camera and sound system to the classroom. The bulky video tape recorder remains in the media center where it receives and records audio and video signals transmitted by cable from any one of the classroom panels.

School Based Dial Access Network

In West Hartford, Connecticut, students in nine interconnected schools may select from a range of eight video channels and 32 audio channels simultaneously. In 1970, the program capacity of the system will be increased to 20 video programs and 100 audio programs. To serve such a system, the origination center must contain 20 different pieces of video equipment (video tape recorders, film chains, etc.) 100 audio tape decks, a video cable capable of carrying 20 video messages at one time, and related switch gear. The number of users is determined by the number of carrels and group areas

receiving the signal. In West Hartford, approximately 1,500 students can d i a l into a single program generated by one video tape recorder. Or, since there are 40 different audio and video programs currently available, all 40 can be used simultaneously by students throughout the network with different purposes in mind. Through the use of regional networks incorporating schools, museums, seats of government, universities, community centers and other neighborhood gathering points, n e w a n d u s e f u l dialogues could begin. The advantages and drawbacks of such developments will be treated in detail later in this paper, but the potential of national and international (via satellite) s y s t e m s interconnecting school and nonschool agencies is an intriguing prospect at this time.

The Dial Access Independent Study Carrel - A Rationale

Since modern teaching strategies stress the education of the individual, the development of an instant access electronic system was, perhaps, inevitable. Through the years, students have either surmounted or been submerged by the obstacles of the lockstep school and curriculum. In order to avoid controversy, assign "equal" teacher loads, conform to Carnegie units and grading demands, and cling to beloved but obsolete grouping practices, many educators have worshipped form rather than function. Uniform structures, self-contained classrooms, seven-period days, 50-minute periods, etc. have dictated the

functions of learning. A unique feature of the American system is that the kindergartner enjoys greater freedom of choice than does the high school senior.

However, in recent years, several schools served as proving grounds for innovation in such areas as curriculum design, staff utilization, flexible schedule, and functional architecture. Teachers and administrators investigating traditional approaches to grouping, class size, facilities design, teacher role, and the utilization of technology have found many existing practices to be illogical, irrational, and without validity. Dissatisfied with their conclusions, theseeducators designed new patterns for instruction assigning introductory, provocative messages to large groups of students, conflicting points of view to small group discussion, and in-depth investigations to independent learners. The large group lecturer used additional planning time to present once that which he previously repeated five times each day. The teacher most capable and at ease in informal settings with small groups was encouraged to capitalize on these special talents. Time, materials, and facilities were provided teacher and student engaged in tutorial exchanges requiring privacy and concentration. New schools were designed with the high degree of flexibility essential to the instruction of groups of varying sizes and purposes.

Still, something was missing. Large group instruction threatened as a new orthodoxy; it contained a fatal fascination for schoolmen and tended to become terminal. The dynamic lecture personality, stimulating visual material, and additional planning time overshadowed the insulation and isolation of the individual in the large group. The large group method had a proper place in the strategy for change but, at best, performed only a fractional role.

Since small group work defied the lecture style of most teachers, administrators were hardput to staff seminars with capable personnel. Most small group meetings degenerated into facsimilies of teacher dominated large group lectures. Finally, many principals were unwilling to depart from the accepted daily pattern of 45-minute packages for all instructional tasks.

Independent study was confounded by unimaginative architecture, rigid staff deployment patterns, and the outdated nature of many instructional resources. Locker benches, library tables and study hall desks were not conducive to independent study. Little professional help, a lack of materials, and an excruciating need for privacy characterized these situations. The "dry" carrel (not equipped for electronic information retrieval) provided privacy and a partial answer to the use of non-print media. Outlets were incorporated in some carrels

to provide access to conventional audiovisual devices. However, this arrangement became impractical as many students, switching from medium to medium, moved in and out of carrels carrying various types of bulky devices. The student was limited to printed material and conventional "audiovisual" equipment. Hence, the advent of the "wet" carrel with electronic access to a variety of audio/video material.

The potential benefits of immediate access to selected segments of audio and video material, instruction in specific skill areas, and transmission of video programs containing legal, medical, insurance, transportation, voting and employment information to inner city areas have already been enumerated. There are, however, other arguments that could be mounted for expansion of the dial access system.

Reduction of Time Lag

For one thing, dial access reduces the time lag between the occurence of an event and its perception by the learner. Despite the promise of television as an efficient means for mass dissemination, it has become increasingly apparent that students do not need the same thing at the same time. Put more precisely, they need what they need when they need it. Single channel fixed schedule educational TV cannot satisfy this diverse array of individual demands. For example, via dial

access, a youngster performing on the football field can dial his performance immediately after the contest and review it with his coach; a group of young actors can dial themselves in action scene by scene following the day's rehearsal; a job applicant can view her manner and conversational technique following a role played employment interview episode; a youngster with speech defects can view his lip movements after a speech exercise; a teacher can dial his own teaching performance following a session with small or large groups of students; an absentee can dial a lesson he missed; cultural events occuring in the vicinity of the school, taped by a mobile production crew, can be made immediately available for student viewing; educational "specials" taped off the air can be offered to individuals or groups the very next day for study and review.

Dial access enables a student to relive important experiences, albeit vicariously. In most conventional programs for the disadvantaged, the child visits an art gallery or a zoo when the teacher decides it is time for the group to take such a trip. The logistics of most school agencies require participation in large numbers in order to bring costs down and spread the benefits to all. Laudable purposes, no doubt, but contrary to the requirements of students expressing needs

as individuals rather than as a group. The youngster returning from the art gallery must wait for the next trip (perhaps a year) before seeing a certain painting again. A child trying to recreate his trip to the zoo through an original sketch, song, or poem, might want to take another look at the funny giraffe's ungainly legs, loping stride, and quizzical look. Through dial access, he can dial his painting or giraffe on film or video tape without having to wait for next year's field trip.

Teacher Role

Use of the dial access system enables the teacher to spend more instructional time pursuing ideas and concepts with individuals and less time on rote and drill with groups. A science teacher can devote more time to the scientific concepts of a lesson when he does not feel compelled to spend such time demonstrating the proper use of lab equipment; an art teacher can spend more time studying the style and meaning of a student's work and less time in teaching that student how to hold the brush, mold the clay, etc.; the electronics instructor can do more tutorial and small group work on the theories of solid state circuitry while students learn the manual skills of circuit construction in the carrel through slide and video tape presentations.

The development of a remote control mechanism enabling the learner to control the start, stop, forward, reverse

and pace of a tape, would also enhance the use of programmed learning techniques and materials through the presentation of sequential frames in audio and video modes. Programmed learning techniques remove some of the abrasive human contact suffered by ghetto bound learners and offer, instead, infinite patience, success, and a "tutor" incapable of discriminating against a student because of his color, appearance, or wealth.

Catalyst For Dialogue

Perhaps the greatest promise of dial access lay in its potential as a catalyst for an electronic dialogue between poverty areas and health, education, and welfare agencies; between school systems and public libraries, museums, planataria, and hospitals; between community services centers and people at home; between classroom teachers, and university scholars --in short, a spectacular exchange between strangers. In the near future, professionals at home and abroad, via satellite, could dial into pre-packaged programs racked in international program banks and receive video and audio transmission in strategically placed remote carrels. Display facilities installed in hospital centers could provide interns, students, and general patients with medical, academic and occupational instruction. Teachers in training at schools of education equipped with dial access systems could dial into nearby public school classrooms to keep informed

about current practices in urban, suburban and rural schools. The possibilities are truly limitless.

Liabilities of Dial Access

The comments thus far could be characterized as idealistic space age prose if not balanced by a rundown of the current limitations and liabilities of dial access systems. Therefore, such factors as high cost, teacher attitude, scheduling difficulties, lack of software, passive environment and hardware limitations should be carefully considered.

Costs and Related Factors

Dial access systems are expensive. Capital, installation, and transmission costs run high. Capable staff is difficult to find and must be paid accordingly. Since dial access installations are mechanical conveyances for instructional matter, they must be manned by technical as well as educational experts. An administrative director, technical staff, curriculum specialist and systems analyst are basic to any successful dial access operation. If local program production is part of the system, then a production supervisor, graphics specialist and camera crew must be employed. In addition, funds must be allocated for the purchase and development of software[2].

An educators handbook, recently compiled at the Catholic University of America contains a survey showing

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[2] See Appendix A for sample costs of dial access components

the existence of 121 operational dial access systems in the country. Only 12 of these have a video capability with s i x of the 12 currently installed in elementary and secondary schools. The majority of systems are audio only and range in initial costs from $10,000 to more than $100,000, the median initial cost being $56,000. All video systems are in the $50-$100,000 initial cost range[3].

Although initial costs are high, they begin to stabilize when the user population expands. The highest long-term continuing cost is for program transmission. In fact, the single greatest financial and technical obstacle to coast-to-coast or other long range interconnections for dial access, computer assisted instruction, or facsimile transmission is the cost of transmission. Line costs vary from area to area throughout the country and are often computed without rhyme or reason. Some AT&T subsidiaries can accommodate dial access systems, others cannot. Rates in our poorest states often exceed those in the wealthiest sections of the nation. Relief can come only through the establishment of special, low

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[3]Ofeish, Gabriel, D. "Dial Access Information Retrieval Systems: Guidelines Handbook for Educators," Office of Education, Bureau of Research, U. S. Department of Health, Education and Welfare, July 1968.

cost public service networks for schools and other public agencies[4].

Teacher Attitudes

Conservative attitudes toward change and technology have been instrumental in retarding the use of dial access in education. Teachers are not dazzled by technology. Some are frightened, some are indifferent, some are enthusiastic. But all are somewhat skeptical and suspicious of the steel and antisepsis represented by a dial access system. They are primarily interested in:

1) the quality of the software displayed in the system
2) student reaction to this software
3) convenience in displaying the software
4) time allotted for program planning
5) additional compensation for dial access planning and activity extending beyond the school day
6) inservice knowledge of production techniques

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[4] In West Hartford where distance is moderate and 12-channel video cable is available, sample costs for transmitting eight video and 40 audio channels from originating point to 50 installations in eight satellite school buildings over a cumulative distance of 12 miles, amount to $360/month for video and $250/month for audio rental with a one time network and headend installation charge of $35,000. This will increase in 1970 when the new Hall High School opens and offers 100 audio and 20 video channels to program users.

7) current and complete data concerning content and location of available software

8) scheduling of system facilities

9) the right to decide, with the student, the nature of the content to be transmitted

10) the "feeling" that they are controlling the system and are part of its development.

These ends can be accomplished through some of the traditional communications techniques --committees, demonstrations, newsletters, etc. However, the most important attitude to engender is the desire to use the system or to advise a student to use it. A teacher who takes part in the planning of the system's development, attends content-oriented seminars taught by content (not audiovisual) experts using components of the new technology, and is offered incentive for such participation is a likely supporter and user of the dial access system. The teacher pressed into participation, after the fact, through promotion and demonstration of hardware only, will merely confirm initial suspicions of the entire enterprise. An inservice program committed to the proposition that teachers who learn via the new technology tend to teach that way, will enhance the probability of developing positive teacher attitudes.

The Software Problem

The very accessibility of dial access to individual users in remote areas offers exciting new possibilities for testing the effect of media (as an isolated variable) upon the lives of individuals and institutions. However, Marshall McLuhan notwithstanding, teachers, students and other potential users continue to seek the message; and much of the message incorporated in the current software catalogue is weak, limited, obsolete, and dull. Terrible gaps in important instructional areas have given credence to the charge that education is software poor.

A headlong dash to design sophisticated hardware has preoccupied the education industry. The subordinate and defensive position assumed by software producers has confirmed the jittery attitudes of many already reactionary educators. Unwilling to depart from the profit proven software staples, producers prefer to cater to this conservatism. Until recently, few significant attempts have been made to produce provocative, short burst (30 seconds - 5 minute) items for the educational market. The traditional 20-50 minute format of the educational film is generally unacceptable for dial access viewing.

Software deficiencies and the uniqueness of the dial access system make school based production centers more important than initially envisioned. The paucity of

good material, the uneasy status of copyright legislation, and the natural bent of staff members to produce original visuals have resulted in the establishment of local studios. However, it would be foolhardy for school systems, or even regional centers, to compete with commercial or ETV stations and education industries, in the production of software. Therefore, a new and unorthodox liaison between the schools and industry is important. Software producers must conduct a scientific, grass roots search for new types of educational materials tailored for a rich mix of learning styles and behaviors as defined by educators working in innovative school systems. Such a strategy encourages experimentation and production based upon curricular needs. The incentive for the corporation is access to a fertile laboratory where identification and field testing of instructional materials for quality and marketability may occur. For the school system, the rewards may be found in the industry's production resources and specialized personnel.

If the "partnership" between industry and education continues to be a front or showcase, rather than a fact, many school districts already pressed to the limit in taxing for school purposes, will continue to shun change. Categorical subsidies from federal or state sources to private companies, small and large, for funding the design and manufacture of experimental materials as loss items might

provide some relief. After a reasonable testing period, financial aid could be withdrawn and the materials left to stand on their own. Such subsidies could be requested by local agencies through categorical grants available under ESEA 89-10, NDEA or the National Science Foundation.

Another possible solution to the problem of software poverty is a string of federally funded production centers staffed with competent TV and production specialists, artists, and script writers, producing programs and low cost materials upon request from regional education laboratories and supplementary services centers. The success of federally funded National Science Foundation project materials has dispelled many fears of federal intrusion in curricular matters. Although the federal production center is political dynamite (and a last resort) it may be the only way to insure a steady output of custom tailored high quality, low cost materials to schools and other public institutions.

Copyright Problem

If the school is to prescribe individualized programs for all students, then pertinent bits and pieces of existing materials must be utilized. The copyright laws will have to be molded to fit this radically new apparatus for independent learning. Although the creator of an educational product should be guaranteed a fair return

for his work, the public school should not be expected to pay royalties similar to those paid by commercial networks or publishers. It is imperative that legislators look carefully at systems which allow thousands of students to dial a series of maps, diagrams, or recordings before deciding on what the school must pay for this privilege.

The Carrel - Active or Passive Environment

The dial access carrel has been justly criticised as a passive environment. Although a convenient multi-sensory dimension has been provided through the combination of viewing screen and headphones, little active physical involvement is required of the student. Carrels at some installations contain record-active microphones which permit students to record responses to audio stimuli and to redial the tape after it recycles for comparison of master and student tracks. A similar feat may be accomplished for video purposes by placing a camera in some carrels in order to video tape student performances of various physical skills. These tapes could then be redialed, played back and compared to the master tape for self correction by the student.

Computer terminals can also be located in carrel areas making for a more active environment. The ratio of terminals to carrels would depend upon the nature of the training agency and the emphasis of its curriculum. The display properties of the dial access screen could

be combined with the manipulative, problem solving functions of a data set connected to a high speed computer. Problems, exercises, and games could be presented in the carrel. The learner could then proceed to a convenient computer terminal to complete his assignments.

Another companion system available to the dial access carrel is the student activated multiple response system. Tests and other stimuli can be presented via the dial access screen soliciting multiple choice responses through the provision of a four or five position button selector at each carrel. This can be connected, in turn, to a master console visible to an instructor, or to a computer for the generation of student achievement or attitude data necessary for student grouping, profiles, and similar purposes.

The High Cost of Limited Access

Current dial access systems suffer restrictions on the number of channels available to individuals with different interests simultaneously vying for available channel time (limited access). The ultimate in individualized instruction would enable each student to gain access to his own video and audio program source at anytime during the school day (random access). Due to technical limitations and high costs, however, it is unlikely that 500 students in a given school would be able to dial into different video programs simultaneously.

Five hundred pieces of originating equipment is simply not affordable by single school districts. Government funding and regionalization are potential alternatives for relief from the high cost dilemma. For example, ten school systems within a given state could apply for state and/or Federal assistance for a regional network of dial access programs. Each system could reserve a given number of video and audio channels for its exclusive use. School system A could reserve 10 video and 50 audio channels; system B might desire 20 video and 100 audio channels, etc. One large program center could provide the switching, intercom, originating equipment, graphics, TV studio and software storage space. If no such building was available in the region, several centers could be established in order to decentralize some of the functions.

Mechanical Conflicts

Dial access hardware contains other built-in limitations. Although instant access is possible, any channel may be tied up by one student dialing a program from any carrel. Another student dialing into the middle of an ongoing program must "join" it at his point of entry or wait for the recycling of the sequence. Particularly vexing is the four track tape deck. Once an audio signal contained on one track is dialed, all four begin simultaneously. This has the effect of forcing new dialers into ongoing sequences on the three remaining tracks.

Although an economy in operation, the four track tapedeck is a hindrance to individualized instruction.

Computer-ized Random Access

Several new developments promise to add some flexibility to the system. A random search device developed by several companies permits the student to dial any pre-selected tape segment over an open channel. Another evolutionary step in giving each student full control over the selection and operation of any program is a random access high speed slave tape system. Now being developed for audio dial access systems in Oak Park, Illinois, the computer controlled random access storage bank contains several multiple-track master tapes on which individual 15-minute lessons have been recorded. The carrel is equipped with a high speed recording device able to copy any one 15-minute program in the storage bank, make the copy available to the student, and free the master tape for another student immediately. Once the slave tape is made, the student has complete control at his carrel. While it remains to be seen whether video tapes can be reproduced in similar speed and fashion, the high speed copy technique should add a highly desirable aspect of flexibility to dial access systems.

Other attempts at providing flexibility are stop-gap. They involve imaginative scheduling and programming arrangements, reserved information channels, assigned time segments of individual channels, extended group use of

basic programs, and staggered carrel assignments for daily use. Computer controlled search, retrieve, and load devices are sorely needed. Most program orders are now being placed in writing or via an intercom. Upon receipt of the written or verbal request, an assistant must locate the desired item, retrieve it and load it before the automatic dial start goes into action. The time involved in such activity is wasteful and restrictive.

The need for random access is particularly apparent in West Hartford, Connecticut where Hall High School, slated to open in 1970, will contain a production and media center transmitting 120 programs (20 video, 100 audio) to 100 dial select carrels and 50 group stations. This expanded program capacity will also be made available to nine other dial select schools (including one in the city of Hartford) through a cable network system currently offering eight video and 32 audio channels. One is staggered by the enormous potential of such an installation. If the optimum length for a single program is 20 minutes, then a single channel is capable of carrying three programs per hour. With 120 channels the system capacity becomes 120 (channels) x 3 (programs) or 360 programs per hour. A five-hour day would theoretically provide the setting for 1,800 programs daily; and a five-day week would mean a weekly capacity of 9,000 programs.

The mathematics is stunning and, at best, suggests that electronics has provided a feasible way for individualizing instruction within a mass educational system. However, before any such conclusions may be reached, random access and retrieval is required.

Dial Access and EVR

Many of the current technical limitations cited above may be solved by the advent of electronic video recording (EVR). Invented by Dr. Peter Goldmark, President of CBS Laboratories, EVR promises to cut hardware costs by 75 per cent while increasing program capacity a minimum of tenfold. The EVR device contains a small cartridge incorporating one hour of black and white or one half hour of color programming on EVR film. Individual frames on each of two tracks can be scrolled by the viewer frame-by-frame as a reader turns the pages of a book. The viewer may switch at any time from track to track, controlling the action through a single lever mounted on the EVR device. The device itself is similar in appearance to an audio tape recorder weighing approximately 35 pounds. By connecting the EVR device to the terminals of any home TV receiver, a view can see the program of his choice played back on the receiver screen. The racking of EVR devices (instead of video tape recorders) in dial access program centers can lead to greater program flexibility as well as system economy. It is anticipated that users

dialing into EVR devices from a variety of locations, could control the pace and sequence of EVR programs through the simple manipulation of a control lever mounted on the remote carrel's dial plate. The combination of remote control EVR with a computer controlled search, retrieve and load device (similar to the ordinary jukebox) could remove many of the limitations of current dial access systems.

Evaluation of Dial Access

Actually, little evaluation of dial access systems of an empirical nature has been done. That is best explained, perhaps, by the nature of the system itself. Since dial select is a synthesis of a variety of multimedia techniques, it does not seem immediately appropriate to repeat traditional studies of TV vs. conventional methods of instruction, since such studies are already available. For example, Wilbur Schramm in 1964 reported a comprehensive analysis of the evidence on learning via ETV in his "What We Know About Learning From Instructional Television"[5]. In 1964, the Schramm Institute also compiled some 300 abstracts of research on instructional television and film representing a substantial sampling of research

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[5]Schramm, Wilbur, "What We Know About Learning From Instructional Television," Educational Television: The Next Ten Years. Stanford: Institute for Communication Research, 1962.

done between 1950 and 1964. Mere replication of such studies for dial select would add little to the literature. However, developmental studies concerning the application of this research in terms of the system and its components can be significant. Dial access is a system, more like a library than a single book, and is as difficult to evaluate with precision as is the library. To assess, for example, the precise educational output of a library is an impossible task. A perfectly controlled experiment to "prove" that the library produced certain valuable outputs would be near impossible. For the same reasons, the nature of dial access as a system precludes its evaluation through "definitive" small scale tests here and there.

Finally, the focus on developmental evaluation must be on <u>how</u> to affect certain things through dial access not on <u>what</u> are effects. For example, one might ask "What are the effects of dial access on student interest?" If initially, dial access affects student interest positively, so much the better. But the developmental evaluation question will probably be more like this: "How is dial access used to affect student interest positively --if 'student interest' is a serious and long range issue relative to dial access?" Since considerable research has been done on the effects of television and

other components of dial access on learning, a more useful technique would be to determine how student learning might be enhanced through a variety of creative uses of the dial access system and a description of such uses. Future developmental investigations should attempt to depict the current position of dial access relative to two poles, namely the teaching and learning conditions pre-dial access, and teaching and learning conditions as they "should be" when dial access is fully developed.

SUMMARY

It seems clear that the following developments must occur if dial access audio-video systems are to succeed and proliferate:

a) A concerted attempt must be made by education and the new education industry to produce high quality, provocative software based on student and curricular needs.

b) A program must be constructed stressing a positive, content oriented approach to teacher training. Teachers impressed by the message should be treated to a synthesis of content, method, and media in their in-service training.

c) Hardware must be designed and produced stressing flexibility, economy, durability, and reliability. Subservient to the needs of the program, the hardware must be dependable enough to contribute to the development of positive user attitudes. Particularly important now is the development of computerized random access system controls, lower cost components and a merged EVR and dial access system.

The federal government can contribute to dial access research and development through projects and agencies funded under the Elementary and Secondary Educational Act of 1965 and the Educational Professional Development Act of 1968. Specifically, the government should urge that selected Title III supplementary services centers, regional laboratories, and other centralized agencies serve as urban communications centers incorporating audio and video program banks available through dial access to people living throughout the city.

It is also urgent that dial access communication centers extend beyond the borders of "education". New instructional techniques and technology should be employed to convey information and service in the areas of health, welfare, law, transportation, housing and employment. Community centers incorporating manpower recruiting offices, housing exchanges, medical clinics,

legal aid societies, facilities for training in the performing arts, and vocational training facilities should be located in the vicinity of school-oriented audio-video program banks, handicapped children's programs, in-service teacher training centers, film libraries, data retrieval centers, graphics and publications services, and modest television production facilities for the preparation of special video tapes to be transmitted to the community as new needs arise.

The appetite of Americans for information is enormous. Negative attitudes toward mechanical delivery of such information are note quite as prevalent as they once were. Better software is beginning to appear. New sources of funding are being tapped. Approached in a systematic manner, assigning first priority to user needs, the future development of dial access systems can bring significant benefits to all.

APPENDIX A

SAMPLE COST ESTIMATES FOR DIAL ACCESS SYSTEMS (Approximate)

Component	Unit Cost	Costs for 10 positions receiving 6 video and 20 audio programs	Costs for 40 positions receiving 6 video and 20 audio programs
Video tape recorder*	$4,000	$24,000	$24,000
Audio tape decks	350	7,000	7,000
Film chain	3,000	3,000	3,000
Intercom	2,500	2,500	2,500
Demodulator video	350	2,100	2,100
Video input amplifier	150	900	900
Video output amplifier	100	600	600
Telephone line equalizers	100	600	600
Carrels (including dial plate, microphone and headset)	250	2,500	10,000
Carrel 9" TV monitor	225	2,250	9,000
Classroom 23" TV monitor with amplifier**	325	-	-
Miscellaneous (frames, cabinets, etc.)		1,500	2,500
Video switching		4,800	14,000
Audio switching		3,500	9,500
TOTAL		$55,250	$85,700
Plus installation costs --approximately 10%		5,500	8,500
GRAND TOTAL		$60,750	$94,200

*New dial access video playback decks have been developed for approximately $1,500. The $4,000 video tape recorder above receives in color --a $500 modification enables it to distribute color. (For remote color reception, the installation of color receivers is necessary.)

**All positions are considered as individual carrels --no classroom monitors are included. However, one can estimate that one classroom installation serves from 25 to 125 users.

The reader will note that the system becomes more economical to install as the number of positions increases. The allocation of certain equipment (video tape recorders, amplifiers, etc.) is based upon the number of inputs and can serve any number of positions. This equipment increases in quantity (and gross cost) as new program channels are added. Other equipment (carrels, monitors, etc.) is based upon the number of positions and will increase in quantity (and gross cost) as the user population grows.

The above estimate does not include cost estimates for staff, consultants, local production facilities, or software --all necessary considerations when planning for a dial access installation.

See Appendix B for transmission and installation costs.

APPENDIX B

SAMPLE TRANSMISSION RATES FOR DIAL ACCESS SYSTEMS IN THE NEW ENGLAND AREA

Audio Rate (Monthly)

voice grade - $1.50 for the first quarter mile
.40 each additional quarter mile
signal line - 1.10 for the first quarter mile
.30 each additional quarter mile

Installation (one time)

voice grade - $10 per circuit

signal line - ? per circuit

Cable Video Rate (Monthly)			Installation (one time)
first channel	-	$9.50/ 1/4 mi.	$760/ 1/4 mi.
second channel	-	1.00/ 1/4 mi.	$475/ 1/4 mi.
third channel	-	1.00/ 1/4 mi.	$375/ 1/4 mi.
channels four through twelve	-	1.00/ 1/4 mi. per channel	No installation charge

Input Video Rate (at Head End)

first input	-	$10.00/ month	$850
second input	-	9.00/ month	$475
third input	-	9.00/ month	$475
inputs four through twelve	-	8.00/ input per mo.	No installation charge

Output Video Rate (at Receiving End)

output one through twelve	-	$ 2.00/ month per output	No installation charge

*These rates are approximate and subject to change.

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